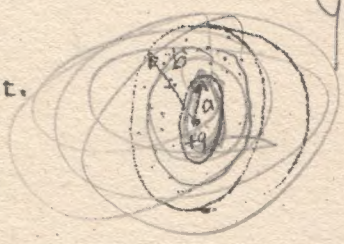
FİZ 145-(21,22)-Basic Physics II

22.5.1991

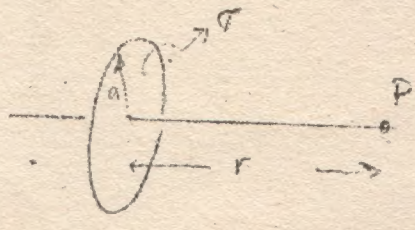
FINAL EXAM

1- The spherical region $a < r < b$ carries a charge per unit volume of $\rho = A/r$ where $A = 9/2\pi a^2$ is a constant. At the center ($r = 0$) of the enclosed cavity is a point charge q. What is the electric field in the regions:

a) $r < a$ b) $a < r < b$?



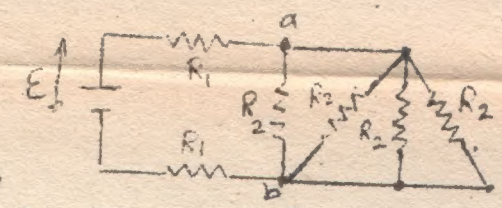
2- a) Find the electric potential for points on the axis of a uniformly charged circular disk whose surface charge density is σ.



b) From this result find the electric field for axial points.

c) What is the electric field for $r \gg a$?

3- In the following figure



a) What is the equivalent resistance of the network?

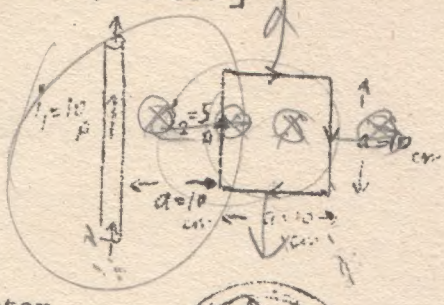
b) What is the current in the circuit?

c) What is the power dissipated in R_1?

d) What is the potential difference across R_2?

e) What is the current through R_2? [$R_1 = 10\Omega$, $R_2 = 40\Omega$, $\varepsilon = 30V$].

4- Figure shows a long wire carrying a current of 10 A. The square loop carries a current of 5A. Calculate the resultant force acting on the loop. [Direction and magnitude] [$\mu_0 = 4\pi \times 10^{-7}$]

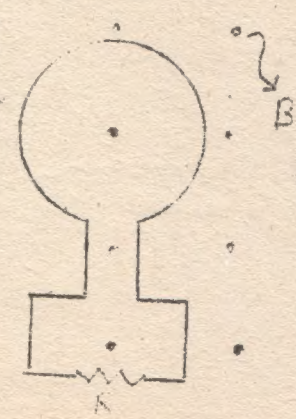


5- Figure shows a cross section of a long conductor. There are two opposite currents (i) in the two conductor. Find B(r) for $b < r < a$

6- The magnetic flux through the loop shown increases according to the relation

$$\Phi_B = 2e^{(1/2)t} + 0{,}3\,t$$

where Φ_B is in milliweber if t is given in seconds.



a) What is the magnitude of the e.m.f induced in the loop when $t = 2$ s?

b) What is the direction of the current through R ?

c) If $R = 10\Omega$ what is the magnitude of the current in R?

[$e = 2.7$; base of natural logarithm]